DOCUMENT RESUME

ED 449 018 SE 064 374

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|---|---|
| TITLE | Your Environment: A Guide for Students. |
| INSTITUTION | Florida State Dept. of Environmental Protection, Tallahassee. |
| PUB DATE | 2000-00-00 |
| NOTE | 24p. |
| AVAILABLE FROM | Florida Dept. of Environmental Protection, 3900 Commonwealth Blvd., Tallahassee, FL 32390. Tel: 904-488-9334. |
| PUB TYPE | Guides - Classroom - Learner (051) |
| EDRS PRICE | MF01/PC01 Plus Postage. |
| DESCRIPTORS | Elementary Secondary Education; *Environmental Education; *Environmental Influences; Puzzles; *Science Activities |
| IDENTIFIERS | *Florida |

ABSTRACT

This environmental guide for students contains stories on air pollution, water pollution, wetlands, groundwater, solid and hazardous waste, and coastal areas. It includes a section on how students can help Florida's environment. A reference section with contact names and addresses for Florida's governmental and citizen organizations is also included. The booklet contains a crossword puzzle, word search, and a glossary of environmental terms. (SAH)

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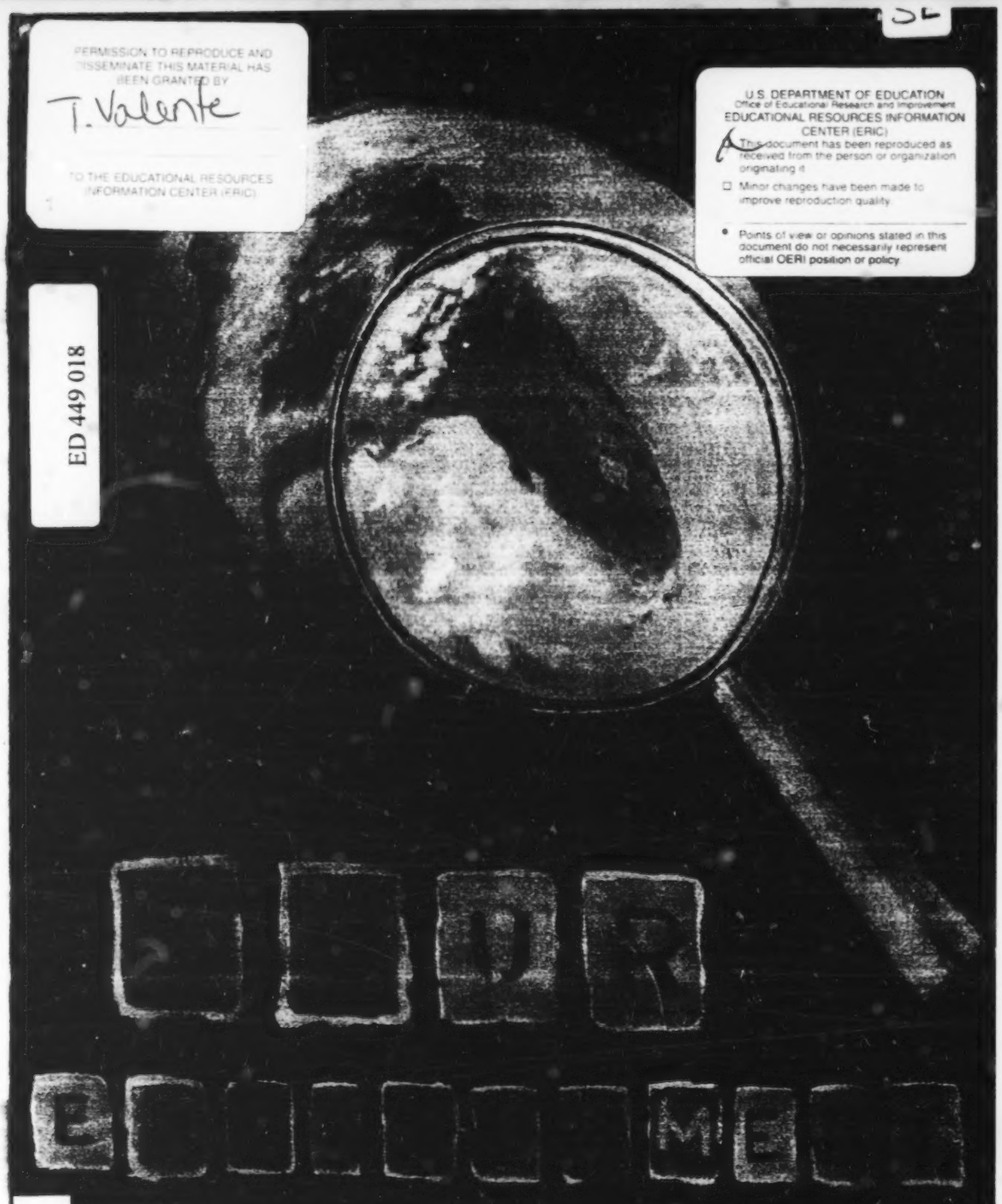

# DOR ECOLOGY

A GUIDE FOR STUDENTS
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

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**Headquarters Office**

**3900 Commonwealth Boulevard**
**Tallahassee, FL 32399**
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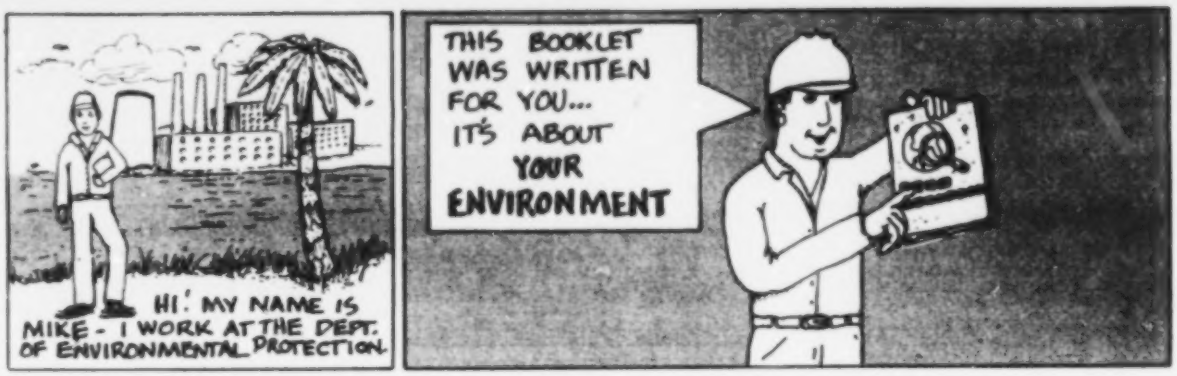

HI! MY NAME IS MIKE - I WORK AT THE DEPT. OF ENVIRONMENTAL PROTECTION
THIS BOOKLET WAS WRITTEN FOR YOU... IT'S ABOUT YOUR ENVIRONMENT

# *Your Environment*

The environment is your surroundings—the city, countryside, and wilderness. Land, air, water, animals, plants and people are a part of it. Florida is fortunate to have a clean environment.

Florida's citizens need a clean environment to live, work and play. Our state's economy depends heavily on visitors who come to Florida for sunshine, clean air and water. Visitors, just like Florida's citizens, enjoy fishing, swimming, sailing, camping, and other outdoor activities.

Not only people depend on the environment. Wildlife also needs a place to live.

Florida's natural resources—our land, water, and air—must be used wisely and protected from abuse. We depend too much on our environment not to protect it.

# *Threats to Florida's Environment*

Nearly 12 million people live in Florida, and another 6,000 move here every week. More people means more cars, more garbage and more sewage. Houses, stores and roads have to be built. Cars add dangerous gases to the air we breathe. Poisons in household garbage can leak into our groundwater. Sewage must be treated, or it will pollute our rivers. Wetlands are filled to make room for houses, and stormwater picks up toxic chemicals from roads. These sources of pollution can harm our environment.

## *What is pollution?*

☆ To a biologist, pollution is a change in the environment which affects the balance of nature.

☆ To a doctor, pollution is a threat to public health from poisonous chemicals and diseases.

☆ But to most people, pollution is damage to the land, water and air which means a loss of their use.

Florida's government is working with industry and citizens to protect the environment. The Department of Environmental Protection is involved in controlling pollution. With the combined efforts of government and citizens like you, we can use the natural resources of our state while protecting our land, water and air for future use.

MANY PEOPLE AT DEP WORK IN LABORATORIES WITH COMPUTERS AS WELL AS IN THE FIELD AS INSPECTORS. SOME OF DEP's PROGRAMS ARE DESCRIBED ON THIS PAGE.

# *Programs of the Department*

The Florida Department of Environmental Protection (DEP) is the main environmental control agency in Florida. The DEP has the overall goal to restore, maintain and improve the quality of our environment in Florida.

The Department of Environmental Protection uses several methods to control pollution. All sources of pollution must get a permit from the department. These permits tell exactly what the pollution source can and cannot put into Florida's air and water.

If a polluter does not obey the permit, the department can take legal action. Polluters can go to jail or be fined up to $10,000 a day.

Department of Environmental Protection programs for environmental protection include:

✓ **Water quality** programs make sure that we have clean water to meet our needs.

✓ **Water quantity** programs make sure we have *enough* water where we want it and when we want it, for a variety of purposes from irrigation to public water supply. Many of these programs are implemented through the state's five regional water management districts, with administrative support and guidance from the department.

✓ **Drinking water** programs protect public health by having a safe water supply. and treatment systems.

✓ **Air quality** programs keep air pollution under control and check on the quality of the air.

✓ **Power plant siting** makes sure we locate electric plants in the right places. Conflicts with the environment are settled before construction starts instead of after a project begins.

✓ **Enforcement** actions are taken by local offices of the Florida Department of Environmental Protection when pollution laws are violated. The DEP also works with other branches of the state and federal government as well as city and county pollution control organizations.

# *Water Pollution*

Florida has over 8,400 miles of coastline. We have 13 major river basins and more than 8,000 freshwater lakes. We also have underground reservoirs called aquifers.

We need clean water. We drink it, wash in it, swim in it and use it to grow plants.

Florida's rivers and lakes support a variety of fish and wildlife found nowhere else in the United States. We also fish, sail and swim in them.

We need clean water for many things. It is important to keep our rivers, lakes and aquifers clean and usable.

Pollution makes our rivers and lakes unhealthy and unsafe to use. Sewage, industrial waste, agricultural wastes, stormwater runoff, thermal and radioactive wastes and dredge and fill activities can pollute our rivers and lakes.

**Industrial wastes** can come from factories, mines, pulp and paper mills, and plants where agricultural products are processed. These wastes can contain poisonous chemicals. If the wastes are not treated, they can kill plants, fish and wildlife and also harm public health.

*Storm water*

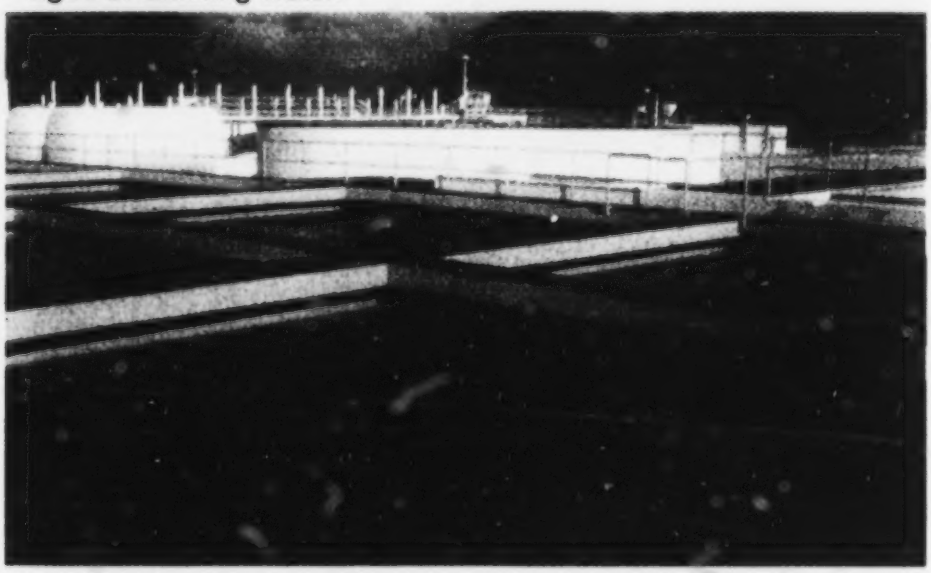
**Sewage** is human and household wastes. It is collected and treated at sewage treatment plants and in home septic tanks. When improperly treated sewage gets into Florida's waters, it contributes to water pollution.

Improperly treated sewage can be dangerous to human health because it can carry disease-causing organisms. Along with the health hazards, improperly treated sewage can damage rivers and lakes. Sewage limits the amount of oxygen in water. If oxygen levels are too low, fish and other life in the water dies.

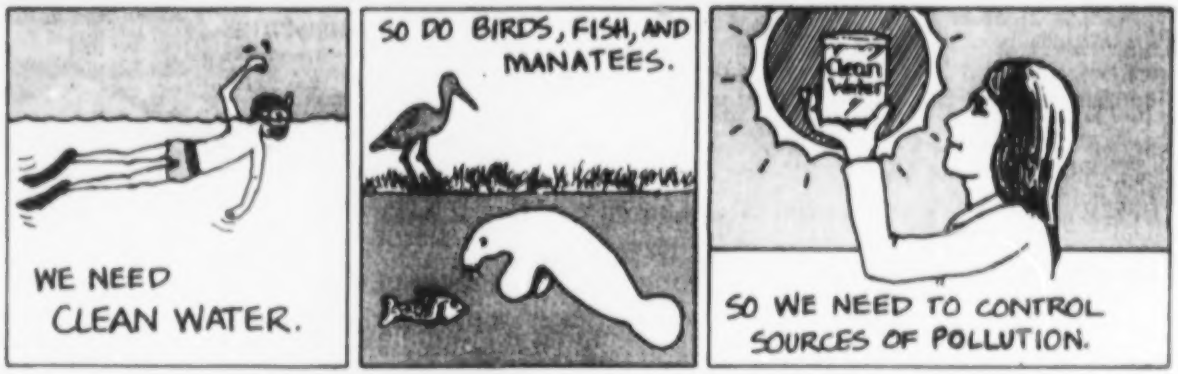
Septic tanks, when not working properly, can allow sewage to seep into Florida's underground water. Almost all of our drinking water is obtained from underground sources. If polluted, we could face shortages of drinking water.

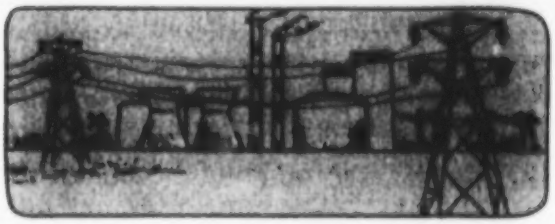
**Stormwater runoff** is more polluted than you might think. Consider all the different things that find their way onto the ground and streets: oil from cars, litter, fertilizer, pesticides, and animal wastes. These are only a few things that are washed away when it rains. Stormwater runoff is not pure, clean rainwater. It is very polluted.

Agricultural runoff carries away the wastes from livestock, the chemicals used in farming, and even the soil. When stormwater runoff from cities or farms enters our lakes and streams, the pollutants can damage water quality and upset the balance of nature.



*A water treatment plant.*



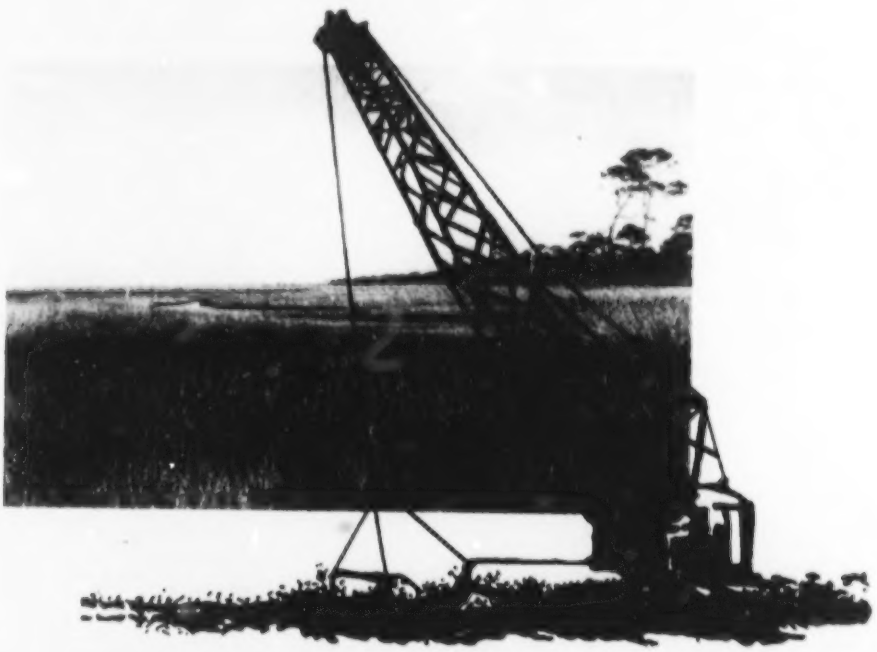



**Thermal and radioactive wastes** are usually related to power plants. Thermal pollution occurs when water used for cooling is returned to our waterways at a high temperature. Aquatic life dies if water temperatures are higher than normal.

Radioactive pollution of our waters is dangerous because nuclear materials are poisonous for hundreds and even thousands of years. If radioactive pollution occurs, the damage will remain for a long time.

**Dredging and filling** creates water pollution when wetlands are filled. Filling in swamps and marshes creates problems because wetlands are natural filtering systems which help keep our lakes, rivers, and bays clean. Wetlands are usually highly productive breeding areas for marine life and are valuable wildlife habitats. Dredging up material from the bottom of a body of water also suspends silt in the water and prevents sunlight from reaching marine life.

Florida has many water resources that are important for our recreation, economy, and public health. The only way our waters can continue to support life is for us to keep them clean and free from all types of pollution.

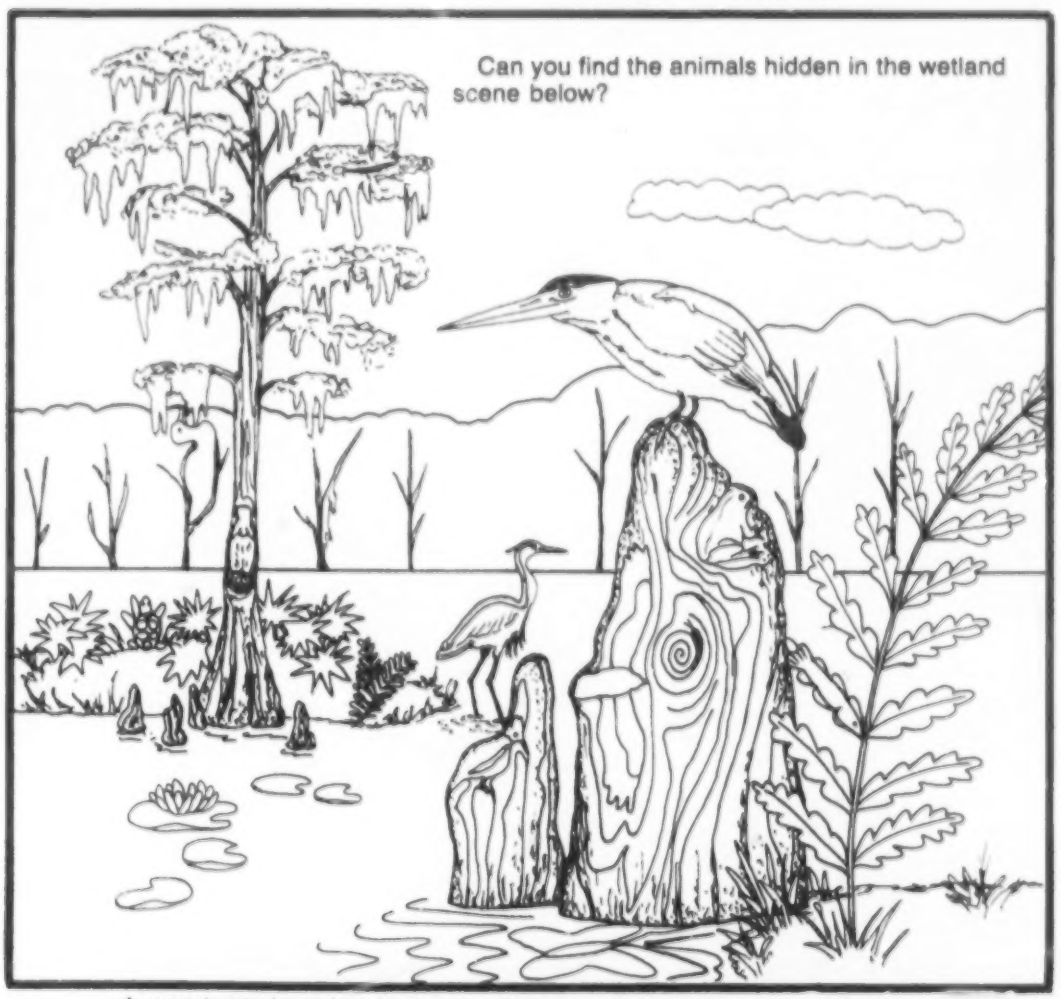


DO YOU THINK SWAMPS ARE USELESS
LOTS OF PEOPLE THOUGHT SO! NOW WE KNOW THAT FLA.'S WETLANDS ARE IMPORTANT. ..." the SOUL of the STATE"

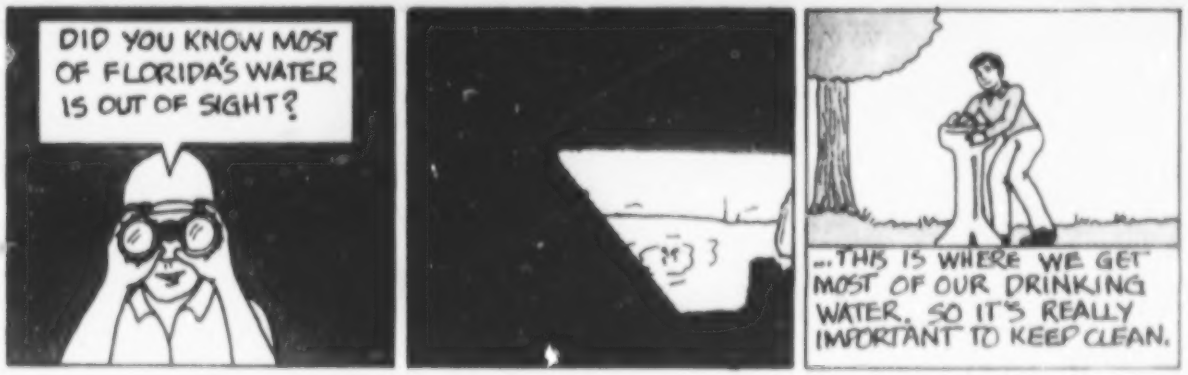
# Wetlands

A wetland can be described as a natural community where the soil is saturated or covered with water for one or more months of the year. Coastal salt marshes, cypress swamps, and wet prairies are examples of different kinds of wetlands.

Coastal wetlands help lessen the effects of storms. Freshwater wetlands are often found along rivers where they naturally filter pollutants and help keep our waterways clean. Wetlands are also important because they store water and are important wildlife habitats.




*Hawk, Snake, Snail, Fish, Otter, Frog, Kingfisher, White-tailed Deer, Turtle, Owl, Duck, Lizard, Butterfly*


DID YOU KNOW MOST OF FLORIDA'S WATER IS OUT OF SIGHT?
...THIS IS WHERE WE GET MOST OF OUR DRINKING WATER. SO IT'S REALLY IMPORTANT TO KEEP CLEAN.

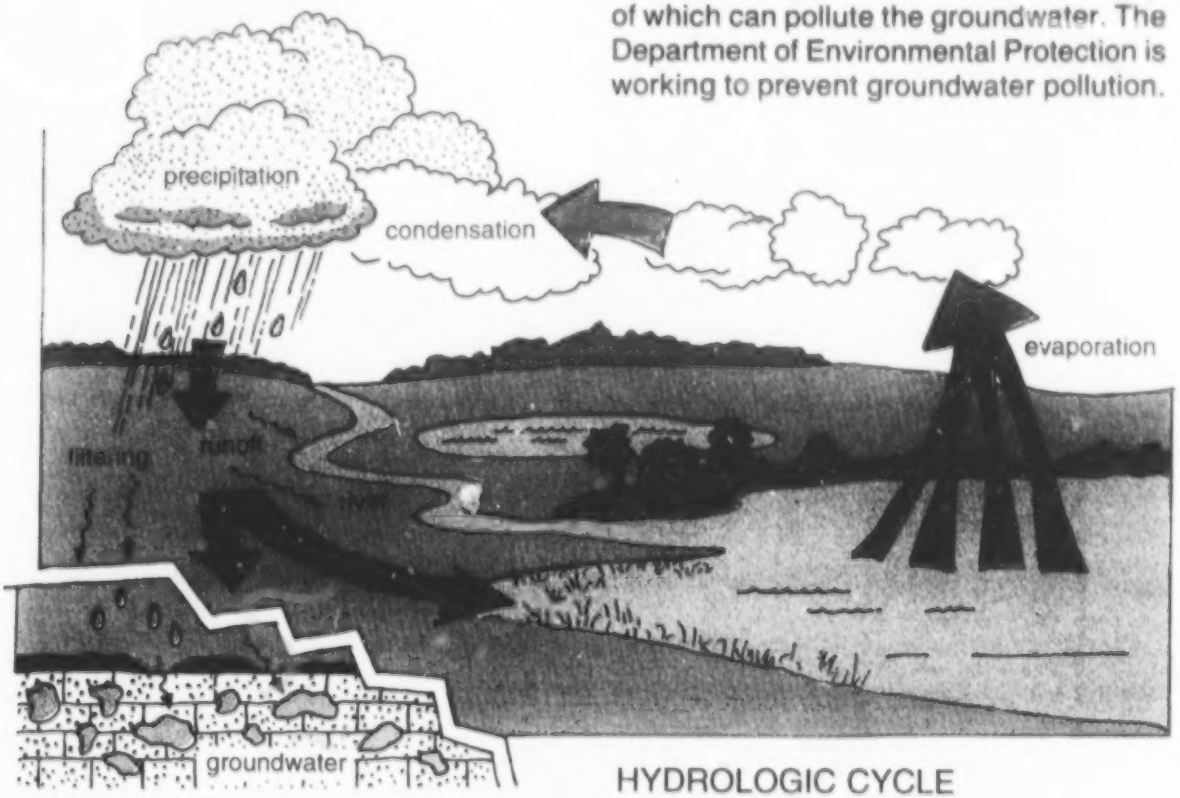
# *Groundwater*

Beneath the surface of the earth, hidden from sight, is a vast underground water supply. It does not look like a lake, but instead it fills the tiny cracks and holes in the rock. This is called groundwater, and it is an important natural resource.

An aquifer is a geologic formation that can produce a significant amount of water to a well, spring, or surface water like a river or lake. Most Floridians use groundwater from aquifers for their drinking water.

As you can see from the drawing of the hydrologic cycle, groundwater begins as rain that slowly trickles down through the soil. These underground water supplies have built up over thousands of years.

Florida's groundwater can become polluted from many sources. The improper disposal of hazardous waste can lead to pollution. Pesticides from farms or gardens or lawns can pass through the soil. Even stormwater runoff can pick up gasoline, animal wastes, oils, and chemicals — all of which can pollute the groundwater. The Department of Environmental Protection is working to prevent groundwater pollution.




HYDROLOGIC CYCLE

DO YOU HAVE TO TAKE OUT THE TRASH?
IMAGINE. HOW MUCH EVERY-BODY THROWS AWAY... AWESOME!
THAT'S WHY WE NEED TO DISPOSE OF TRASH AND GARBAGE PROPERLY IN LANDFILLS.

# *Solid and Hazardous Waste*

Improper disposal of solid waste can damage the environment. In addition to household garbage and trash, solid wastes sometimes include materials that can poison the soil and seep into underground water supplies. Some chemicals remain poisonous for so long that future generations may be affected by the pollution we cause today.

Sanitary landfills are replacing open, unhealthy dumps. Trash and garbage are covered by layers of earth in a sanitary landfill. When they are full, the land can be used for playgrounds, tennis courts and golf courses.

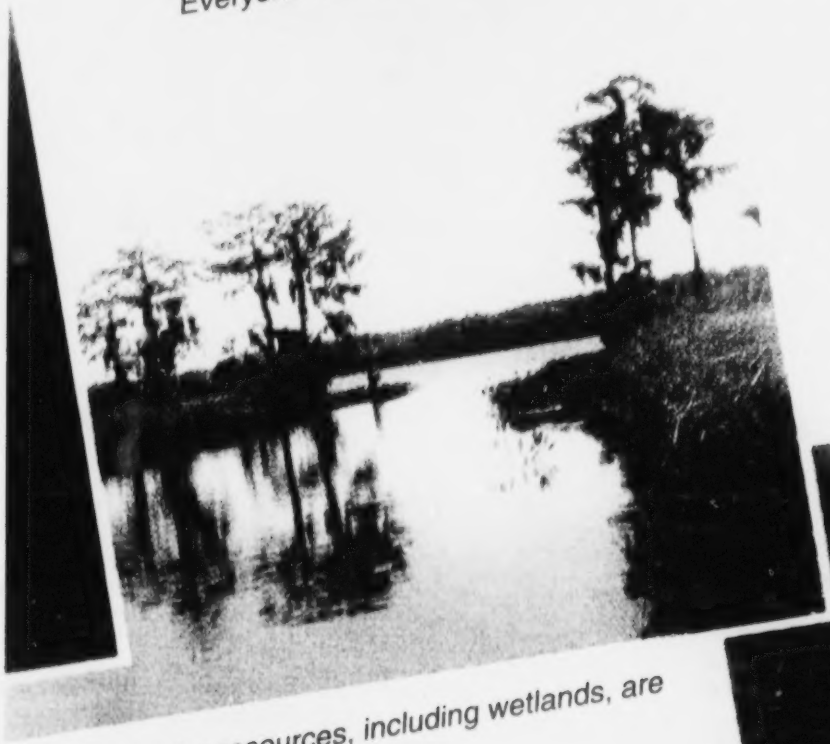
Recycling materials and proper disposal of only those wastes which absolutely have to be discarded will reduce the amount of solid waste.

# Protecting Florida and your quality of life

Water Lilies

Florida's environment is beautiful, but fragile. From space, you can see the shape of Florida and the curve of the earth.

Everyone needs clean air.



Our water resources, including wetlands, are important to all Floridians.

Manatee

IN ADDITION TO PROTECTING WATER, WE NEED TO KEEP OUR ATMOSPHERE CLEAN AND HEALTHY.
WE BREATHE IN AND OUT THOUSANDS OF TIMES EACH DAY.
... CLEAN AIR IS ESSENTIAL!
DO YOU KNOW WHAT CONTRIBUTES TO AIR POLLUTION?

# Air Pollution

Air is all around us. We need it to live. An average person breathes about a cubic foot of air every minute. Your lungs filter out pollution in the air, but there is a limit to the amount of pollution your body can handle. If air becomes too polluted, it is a threat to public health, especially for people who have respiratory diseases like asthma, bronchitis, and emphysema.

In Florida, even though our air is relatively clean, we have some pollution problems. Some sources of air pollution are agriculture, industry and transportation.

**Agricultural activities** such as processing and refining, open burning of sugar cane fields, or burning smudge pots and tires to prevent frost damage to crops can pollute the air. Improper use of chemicals and spraying pesticides into the air also contribute to the air pollution problem.

**Industrial activities** have special ways to control pollution. Pulp and paper mills, asphalt and cement plants, refineries, and incinerators are among the many industries that must work to keep our air clean. For example, power plants must limit sulfur dioxide if they burn oil or coal that contains too much sulfur. Too much sulfur emited into the air can result in acid rain. Acid rain can be harmful to the environment.

*Burning fields can pollute the air.*

*Many industries must limit their air pollution.*

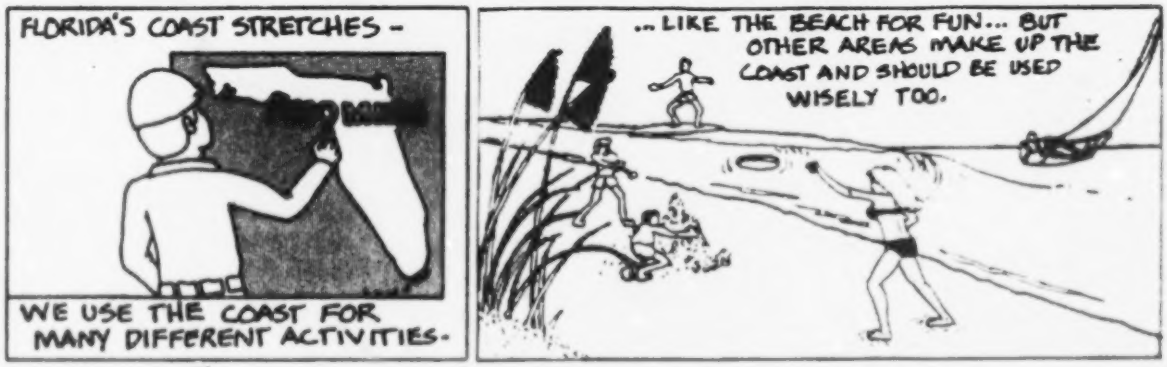
IF YOU GUESSED "SMOKE STACKS" YOU ARE PARTLY RIGHT...
CARS ARE THE BIGGEST SOURCE OF AIR POLLUTION
...AND LOTS OF OTHER THINGS CAUSE AIR POLLUTION... INCLUDING FIRES AND CHEMICALS.

**Transportation** is the most difficult source of pollution to control. Cars, trucks and planes are responsible for much of our air pollution. Automobiles are the largest source of carbon monoxide and nitrogen oxides. These chemicals are turned into smog by the sun through a process called photochemical reaction. If only one car were poorly tuned or did not have air pollution control equipment there would not be a problem. But think of the combined exhaust from all the cars and trucks in Florida. This is why, in several of the larger cities in Florida, owners of automobiles are required to have their cars tested for air pollution. This Motor Vehicle Inspection Program, along with a statewide anti-tampering program (to make sure owners do not remove or tamper with air pollution control equipment installed on their cars), was begun in 1991 and will help reduce the amount of air pollution.

Almost everything people do can cause air pollution. Driving cars or boats, working in a factory or on the farm, barbecuing, burning leaves, spraying chemicals, and even paint evaporating into the air contributes to air pollution.

In addition to man-made pollution, natural pollution can be part of our problem. Dust storms as far away as Texas or the Sahara Desert can affect our air quality in Florida. Dust can be carried great distances by the wind and high altitude air currents before it settles out and falls to the ground. Can the same thing happen with man-made pollution? Pollution can be carried from the cities to the countryside or from state to state.

The United States Congress recognized air pollution as a national problem when it passed the Clean Air Act in 1972. The Act sets up goals for clean air across the nation. In Florida, state and local governments are helping protect air quality by enforcing pollution control laws and making plans to clean up the air according to the Clean Air Act. The Act has been enhanced and expanded twice since then, in 1977 and 1990, to further reduce air pollution.

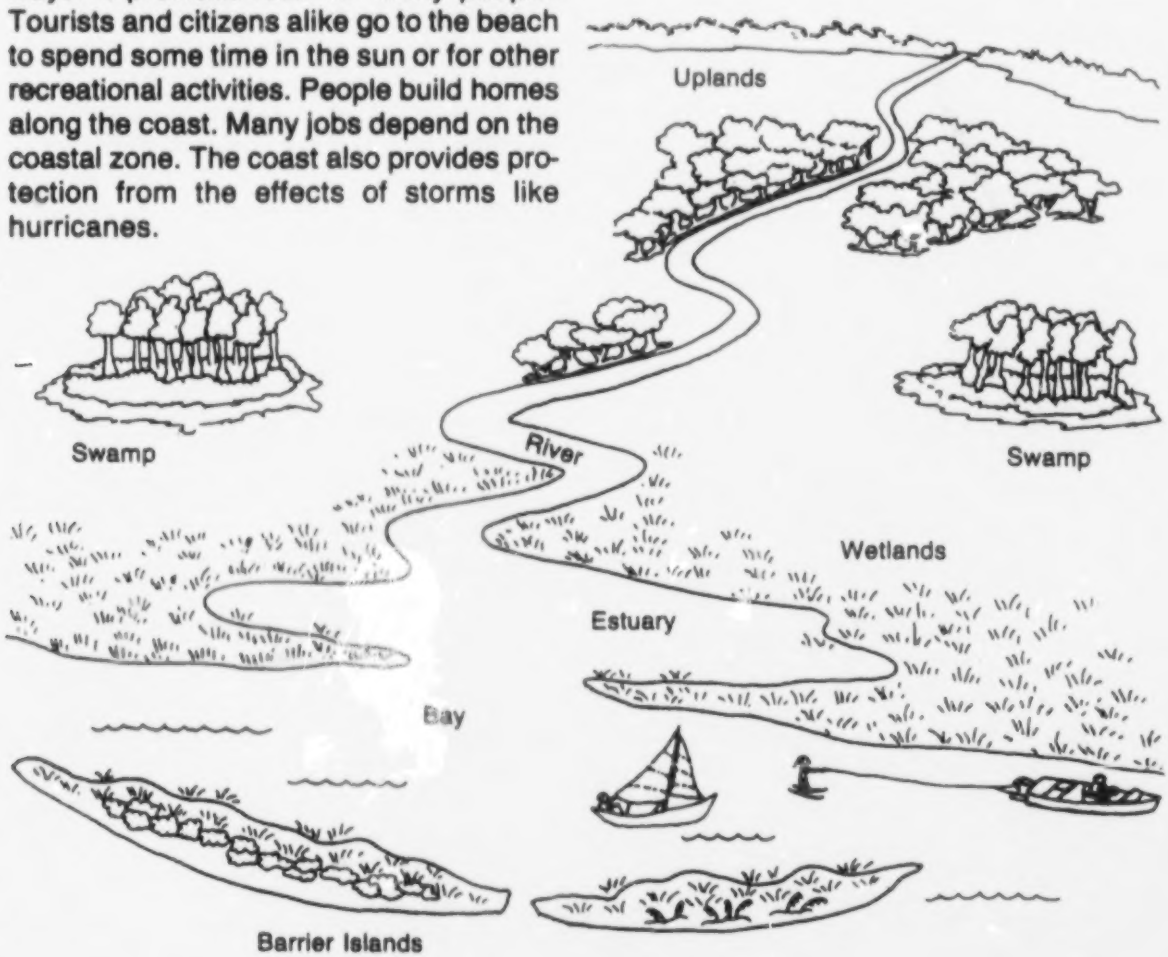

FLORIDA'S COAST STRETCHES -
WE USE THE COAST FOR MANY DIFFERENT ACTIVITIES.
... LIKE THE BEACH FOR FUN... BUT OTHER AREAS MAKE UP THE COAST AND SHOULD BE USED WISELY TOO.

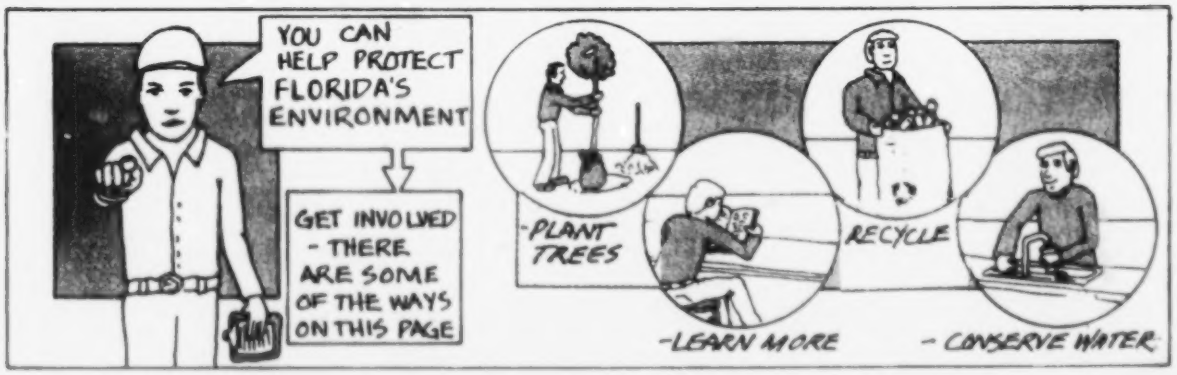
# *Color the Coast*

Florida has over 8400 miles of coastline. But the coast is more than just a beach. It includes a broad area where the land meets the water.

The coast is important in a number of ways. It provides food for many people. Tourists and citizens alike go to the beach to spend some time in the sun or for other recreational activities. People build homes along the coast. Many jobs depend on the coastal zone. The coast also provides protection from the effects of storms like hurricanes.

You can see how important Florida's coast is. By working together, we can help protect and preserve our coastal resources.




YOU CAN HELP PROTECT FLORIDA'S ENVIRONMENT
GET INVOLVED - THERE ARE SOME OF THE WAYS ON THIS PAGE
-PLANT TREES
RECYCLE
-LEARN MORE
- CONSERVE WATER

# *Helping Florida's Environment*

As a Florida citizen you can help protect our environment. If you think a clean environment is important to life, you will want to become involved in protecting it.

A good way to start is by contacting governmental agencies involved in the management and protection of our natural resources to get information about Florida's environment. Another way is to contact state and national conservation organizations. These groups are made up of private citizens like you who are concerned with the environment. Some have special programs for young people.

This booklet has shown that many things people do can cause pollution. People are a part of the environment and have a rightful place in the earth's ecosystem. Our future depends on how well we live *with* the environment. Remember..."if you are not part of the solution, you are part of the problem."

## Things you can do to help the environment

- Find out about recycling in your community.
- Organize a litter clean up project.
- Study an environmental problem as a school project and then write a letter about your findings to the newspaper.
- Talk to your teacher and principal about setting up a recycling program at your school.
- Make an exhibit on air pollution using examples from your community.
- Organize a tour of your local water supply or sewage treatment plant for your class.
- Collect samples of water from lakes and streams for chemical testing in your school's science department. Compare the findings with water quality standards.
- Encourage your parents to reduce driving and car pool or share a ride.
- Do a report on the activities that can be restricted by pollution.

DEP WORKS WITH OTHER STATE AND LOCAL AGENCIES THAT WORK WITH THE ENVIRONMENT.
HEALTH & REHABILITATIVE SERVICES
DIVISION OF FORESTRY
MARINE PATROL
GAME AND FRESHWATER FISH COMMISSION

# Florida's Government

A number of state agencies are involved in managing and protecting Florida's environment. These agencies are willing to help you with your concerns and will provide information upon request.

**Department of Agriculture**
Division of Forestry
3125 Conner Blvd.
Tallahassee, FL 32399-1650
*Protects and manages Florida's forests and woodlands. Issues permits for open burning.*

**Department of Commerce**
Office of Information
Collins Bldg.
Tallahassee, FL 32399-2000
*Promotes Florida's environment for visitors and businesses.*

**Department of Education**
Turlington Bldg.
Tallahassee, FL 32399-0400
*Coordinates programs for teachers and students on environmental education.*

**Department of Environmental Protection**
3900 Commonwealth Blvd.
Tallahassee, FL 32399-3000
*Administers programs to protect and manage Florida's environment and programs for wise use and conservation of Florida's natural resources and state lands. Enforces pollution control laws.*

**Game and Fresh Water Fish Commission**
Information Services
Bryant Bldg.
Tallahassee, FL 32304
*Protects and manages wildlife and freshwater fish resources. Reviews the biological effects of land and water use.*

**Department of Health and Rehabilitative Services**
Public Information Office
1323 Winewood Blvd.
Tallahassee, FL 32399-2850
*Responsible for protecting public health; participates in drinking water testing program.*

MANY CITIZENS LIKE YOU BELONG TO SPECIAL GROUPS THAT ARE CONCERNED ABOUT THE ENVIRONMENT.
- WHY NOT JOIN THEM?
- SOME ARE LISTED ON THIS PAGE.

# *Florida's Citizen Organizations*

Citizen organizations play an important part in protecting Florida's environment. They are made up of people who are willing to work for environmental legislation and decisions. Some of these organizations may have groups in your area. Some have special environmental education activities and programs for young people. Others distribute information about conservation issues. Write to find out more about their interests and activities.

**Florida Audubon Society**
460 E. Highway 436
Casselberry, FL 32707

**Florida Conservation Foundation**
1191 'Orange Ave.
Winter Park, FL 32789

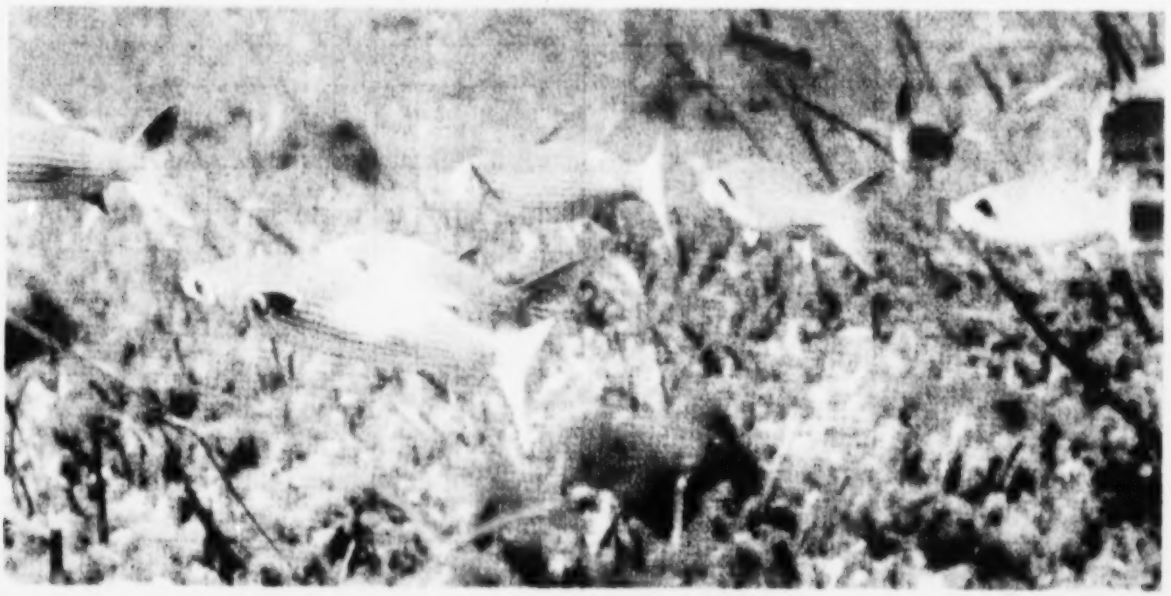
**Sierra Club**
Post Office Box 11248
Knoxville, TN 37919

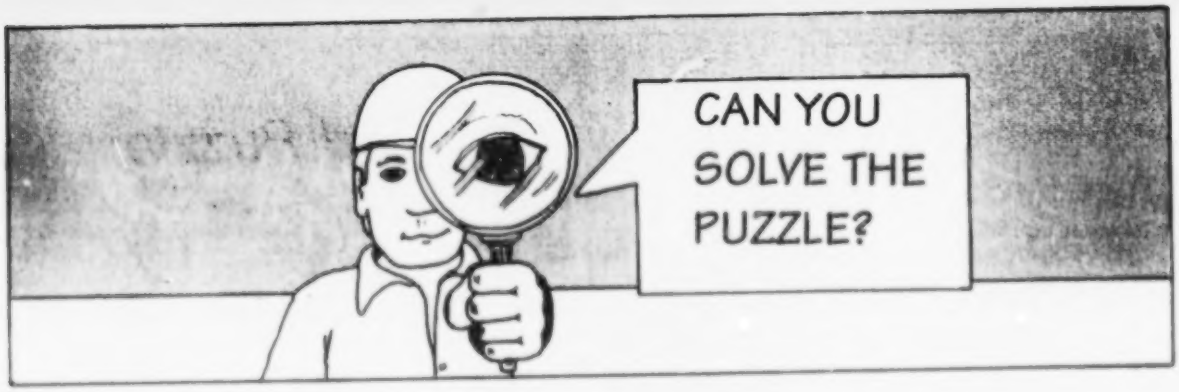
**The Nature Conservancy**
Florida Chapter
1331 Palmetto Ave., Suite 205
Winter Park, FL 32789

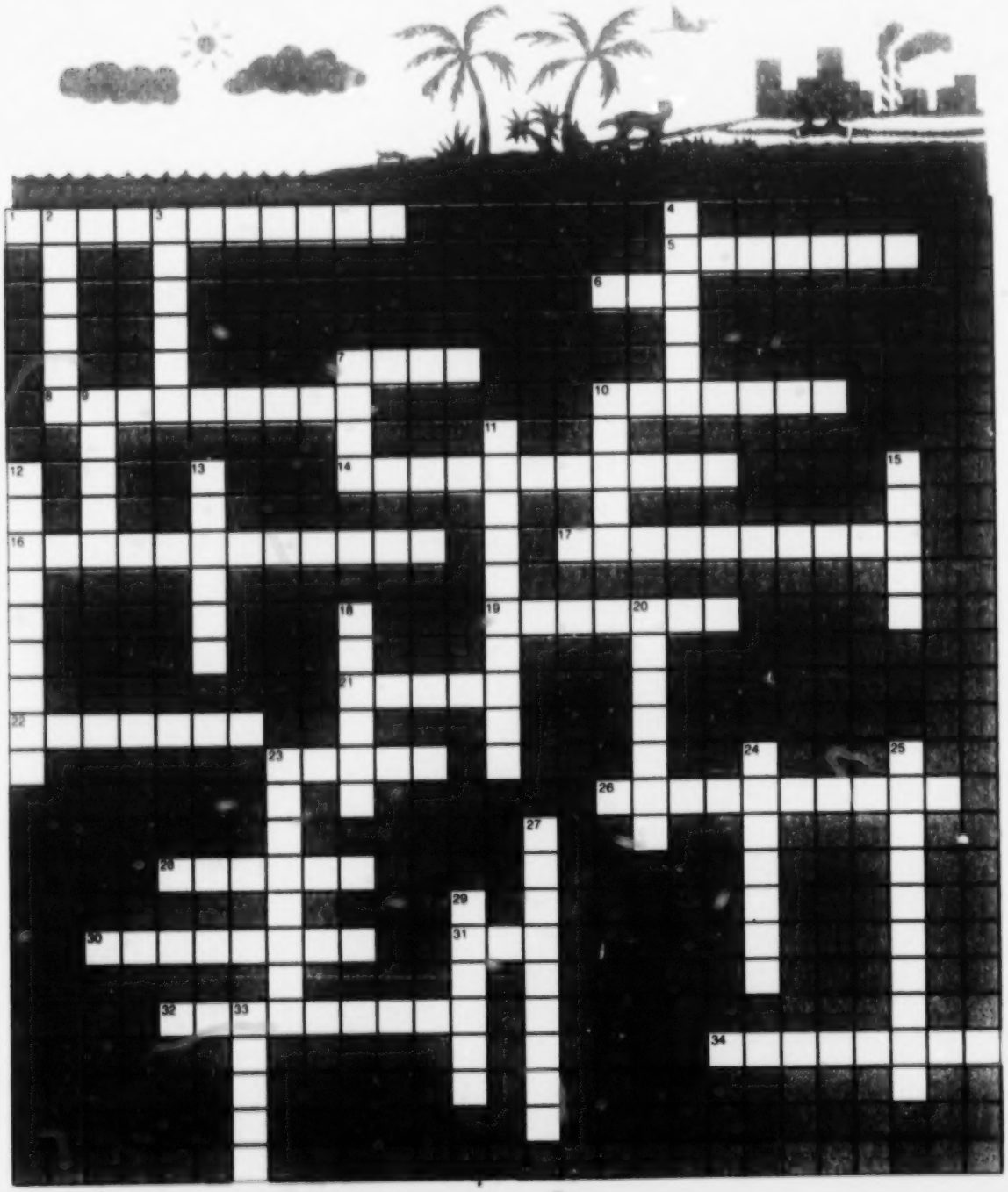
**Florida Defenders of the Environment**
2606 N.W. 6 St.
Gainesville, FL 32609

**Florida Wildlife Federation**
P.O. Box 6870
Tallahassee, FL 32314

These are a few Florida citizen organizations. Check with your local library for others.




CAN YOU SOLVE THE PUZZLE?



# *Environmental Crossword Puzzle*

**Across:**

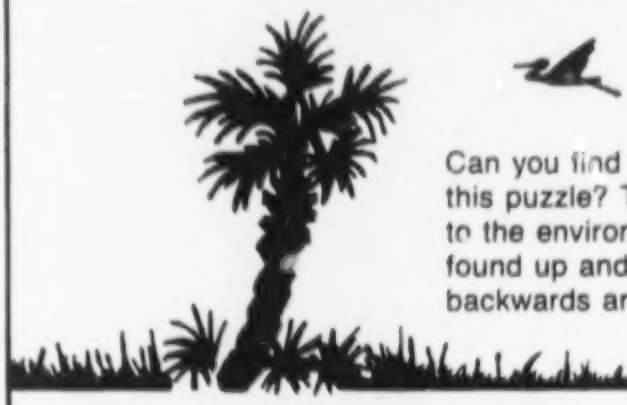
1. Your surroundings
5. Where an animal lives is called its _____
6. What we all breathe.
7. Pollution can sometimes seep through the _____ into underground water supplies.
8. All living things are part of an _____.
10. As a _____ of Florida, you can help protect our environment.
14. Much of Florida's drinking water comes from this source.
16. The wise use, without waste, of natural resources.
17. Rain that washes off the land into bodies of water is called _____ runoff.
19. Even household _____ often contains things that can pollute the environment.
21. People and wildlife can't live without __ to drink.
22. _____ materials can stay poisonous for thousands of years.
23. If a polluter does not obey the permit, DEP can take _____ action.
26. A law or rule written to help control pollution or protect the environment.
28. One threat to wetlands is when we ___ and fill them.
30. Wetlands are valuable as homes for _____
31. If you throw gum and candy wrappers, soft drink cans, and papers on the ground, they become _____.
32. Something that damages the environment.
34. These swampy areas are important for storing water.

**Down:**

2. A clean environment is important to all things in _____.
3. Florida has 13 major _____.
4. Pollution is a ___ to our environment.
7. Chemicals in the air combine with sunlight to form _____.
9. It is important to everyone to have a _____ environment.
10. Animals like pelicans and manatees live along Florida's _____.
11. An ___ species is a plant or animal in danger of becoming extinct.
12. One example of _____ is returning aluminum cans to be reused.
13. All sources of pollution must get a _____ from DEP.
15. Our planet
18. Human and household wastes
20. Underground formation containing water.
23. The trash you take out to the curb is buried in a sanitary _____.
24. _____ has many precious resources.
25. A number of agencies in state _____ help manage and protect Florida's environment.
27. Used to control insects.
29. Land, air, water, animals, and _____ are all part of the environment.
33. Wetlands are natural filtering systems which help keep ___, rivers, and bays clean.

Answers to the crossword puzzle can be found on the last page.

# SEARCH FOR HIDDEN WORDS



Can you find 30 words hidden in this puzzle? The words all relate to the environment. They are found up and down, sideways, backwards and diagonally.

P O L L U T I O N R A E L C U N R S
P E S T I C I D E F I L D L I W B D
W G O M S W E T L A N D S W L P H W
Z N L N O I T A L U G E R X E K A C
T C T F J R G O V E R N M E N T Z T
D F N T H J T L F F O N U R E N A N
R P E R M I T A N I S V Y R B E R P
E R M A B N O I T A L U P O P M D S
C U N S C R B A H I L J C F P P O U
Y U O H E D V H K C B F L E M O U O
C X R V C R L A R U T A N E R L S N
L Q I B E R R Z H H P G H R S E P O
I R V S S T I B C F H L V T W V Y S
N B N E R B F A J T S E R O F E M I
G O E W A D E N E Z I T I C G D N O
C R S A C B W I L D E R N E S S R P
P Q M G L B D A L R R E F I U Q A E
D R A E X T I N C T E C R U O S E R

**General Terms:** environment, pollution, development, natural, wildlife, habitat, population, poisonous, extinct, resource; **Natural Resources:** wetlands, river, beach, forest, air, water, wilderness, aquifer, tree; **Pollution:** runoff, nuclear, hazardous, smog, pesticide, cars, trash; **What helps:** regulation, citizen, government, conservation, recycling, permit.

FLORIDA HAS A WONDERFUL ENVIRONMENT...
A GREAT PLACE TO LIVE...WORK...AND PLAY.
IT BELONGS TO YOU TOMORROW - SO HELP PROTECT IT TODAY!

# *Glossary*

**Aquifer** — Underground rock formations which hold water.

**Conservation** — Avoiding waste of, and when possible renewing, the human and natural resources of the world.

**Dredging and filling** — Digging up the bottom of a river, lake, stream or bay and using the dirt to fill in marshes and swamps.

**Ecosystem** — The entire system of living things as they relate to each other and their surroundings.

**Pesticides** — Chemicals that kill pests.

**Recycling** — Cleaning and reusing things that have already been used.

**Resource** — A person, thing or action needed for living or to make life better.

**Smog** — Eye-stinging haze that hangs over most cities and is produced when chemicals in the air mix with sunlight.

**Stormwater runoff** — Excess rainwater that drains off of the land into lakes and other bodies of water.

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## Answers to crossword puzzle

**Across:**

1. environment
5. habitat
6. air
7. soil
8. ecosystem
10. citizen
14. groundwater
16. conservation
17. stormwater
19. garbage
21. water
22. nuclear
23. legal
26. regulation
28. dredge
30. wildlife
31. litter
32. pollution
34. wetlands

**Down:**

2. nature
3. rivers
4. threat
7. smog
9. clean
10. coast
11. endangered
12. recycling
13. permit
15. earth
18. sewage
20. aquifer
23. landfill
24. Florida
25. government
27. pesticide
29. plants
33. lakes